MYCOTAXON

Volume 112, pp. 367–370 *April–June 2010*

Dictyostelids from Ukraine 2: two new records of *Dictyostelium*

Pu Liu[1] & Yu Li[2]*

*[1]puliu1982@yahoo.com & [2]*yuli966@126.com*
Engineering Research Center of Chinese Ministry of Education for Edible and Medicinal Fungi, Jilin Agricultural University
Changchun 130118, P. R. China

Abstract —Two species of *Dictyostelium* are reported for the first time in Ukraine. *D. magnum* and *D. brefeldianum* were isolated from forest soil and leaf litter collected from Yalta, Crimea, Ukraine. The descriptions and photographs of their important life cycle stages are provided based on Ukraine materials. The specimens have been deposited in the Herbarium of Mycological Institute of Jilin Agricultural University (HMJAU), Changchun, China.

Key words —cellular slime mold, taxonomy

Introduction

Dictyostelid cellular slime molds, or dictyostelids, are a relatively small but quite remarkable group of organisms (Raper 1984). In the life cycle, they share the protozoan characteristics of myxamoebae and pseudoplasmodia and fungal characteristics of fructifications and spores. Since Oskar Brefeld (1869) reported the first species of cellular slime mold and named *D. mucoroides* Bref., approximately 60 *Dictyostelium* species have been described (Kirk et al. 2008). *Dictyostelium* is the oldest and largest dictyostelid genus. The present paper is the second report of dictyostelids in Ukraine since *D. implicatum* H. Hagiw. and *D. tenue* Cavender, Raper & Norberg were first isolated from this country (Liu & Li 2010).

Materials and methods

The soil and leaf litter samples were collected during October 2008 in Baydar Valley, Eski-Kermen and Angara Valley, Yalta, Crimea, Ukraine. The samples were refrigerated at 4°C and isolated according to He & Li (2008). Five agar plates were established and incubated at 23°C with 12 h light and 12 h darkness.

*Corresponding author

The locations of each early aggregating clone and sorocarps were marked. The life cycle stages of cell aggregation, pseudoplasmodium, and sorocarp were observed under a Nikon dissecting microscope (SMZ1500) with 0.75–11.25× range (10× oculars). Spores, stalks, and sorocarps were measured using a Nikon light microscope (SMZ1000) with 10× oculars and 10, 40, and 100× (oil) objectives. Photographs were taken with a Canon S70 camera.

Results

1. ***Dictyostelium magnum*** H. Hagiw., Bull. Natn. Sci. Mus., Tokyo, Ser. B, 9(4): 155 (1983). Fig. 1 A–E

Sorocarps solitary, usually unbranched, phototropic, sometimes prostrate. Sorophores colorless, sinuous, 0.7–11.0(–60) mm long, usually tapering from bases to tips, bases expanded and stout, tips blunt. Sori white, globose, 30–500 μm diam. Spores hyaline, elliptical, usually 6.5–8.8 × 3.5–5.0 μm, without polar granules. Cell aggregations radiate. Pseudoplasmodia not migrating without sorophore formation, usually producing single sorogens. Myxamoebae irregular or triangular in the direction of movement.

Specimens examined: MR041. Isolated from forest soil collected by the authors in Angara Valley (10 Oct. 2008, S0299-2), Yalta, Crimea, Ukraine in 2009. Deposited at the Herbarium of Mycological Institute of Jilin Agricultural University (HMJAU), Changchun, China.

Comments—*Dictyostelium magnum* is a gigantic species. It is most likely to be confused with three other very large species — *D. firmibasis* H. Hagiw. (Hagiwara 1971), *D. giganteum* B.N. Singh (Raper 1984), and *D. septentrionale* Cavender (Raper 1984). The spores of *D. magnum* are, however, stouter and shorter than those of *D. firmibasis* (6.2–9.2 × 2.7–4.0 μm). Hagiwara et al. (1992) suggested *D. magnum,* isolated from soil samples collected in Taiwan, is probably synonymous with *D. giganteum,* and later mating tests by Hagiwara (1992) support this synonymy. Our research shows that these two species differ in spore and sorocarp sizes. The spores of *D. magnum* (6.5–8.8 × 3.5–5.0 μm) are bigger than those of *D. giganteum* (5.5–7.2 × 2.1–3.9μm). The sorocarps of *D. magnum* are somewhat smaller [0.7–11.0(–60) mm] than those of *D. giganteum* (0.5–70 mm). Such differences support their separation as two distinct species. In the laboratory, *D. septentrionale* itself needs lower temperature conditions (12–19 °C) and fails to fruit at higher temperatures (Raper 1984), whereas *D. magnum* could be cultured at 20–23 °C.

2. ***Dictyostelium brefeldianum*** H. Hagiw., Bull. Natn. Sci. Mus., Tokyo, Ser. B, 10(1): 39 (1984). Fig. 1 F–K

Sorocarps solitary, usually unbranched, phototropic, prostrate. Sorophores colorless, sinuous, 0.6–4.5(10.5) mm long, tapering from bases to tips, usually

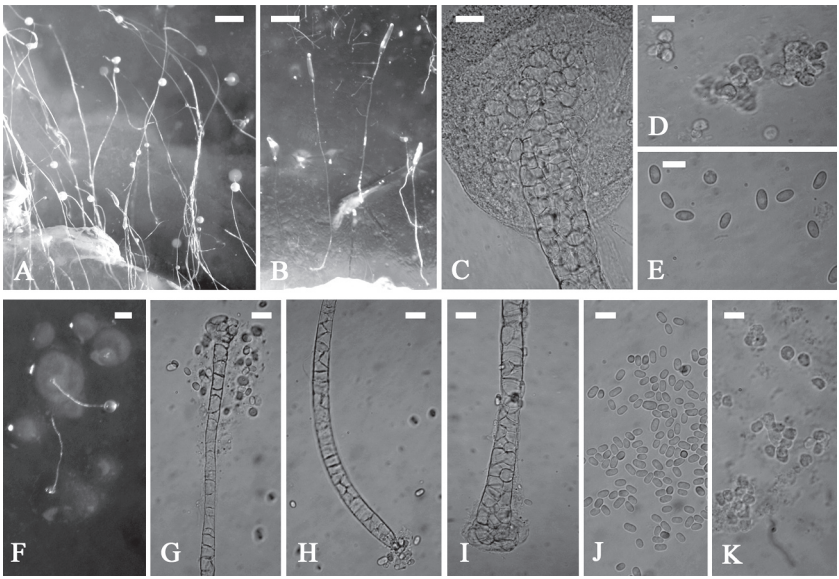

Figure 1. A–E, *Dictyostelium magnum*; F–K, *D. brefeldianum*. A, F, Sorocarps (bar = 0.5 mm); B, Pseudoplasmodia (bar = 0.3 mm); C, H, I, Sorophore bases (bar = 15 μm); D, K, Myxamoebae (bar = 15 μm); E, J, Spores (bar = 15 μm); G, Sorophore tips (bar = 15 μm).

consisting of one tier of cells except for the bases and tips, bases conical or round, tips capitate. Sori white, globose, 25–230(280) μm diam. Spores hyaline, oblong, mostly 5.3–7.3 × 3.0–4.0 μm, without polar granules, sometimes with irregular granules. Cell aggregations radiate. Pseudoplasmodia not migrating without sorophore formation, usually producing single sorogens. Myxamoebae irregular or triangular in the direction of movement.

Specimens examined: MR043. Isolated from the mixture of forest soil and leaf litter collected in Baydar Valley (8 Oct. 2008, S0276-5) and forest soil collected in Angara Valley (10 Oct. 2008, S0308-3), Yalta, Crimea, Ukraine in 2009. Deposited at the Herbarium of Mycological Institute of Jilin Agricultural University (HMJAU), Changchun, China.

Comments—*Dictyostelium brefeldianum* is a medium-sized species that is often prostrate and strongly phototropic. Its macroscopic characteristics are similar to the closely related species, *D. implicatum* H. Hagiw. (Hagiwara 1984a) and *D. arabicum* H. Hagiw. (Hagiwara 1991). However, it differs from those similar species in its capitate sorophore tips and oblong spores lacking polar granules. Other species with capitate tips include *D. crassicaule* H. Hagiw. (Hagiwara 1984b) and *D. septentrionale* (Raper 1984), which have stout and thick sorophores, *D. purpureum* Olive (Raper 1984) and *D. mexicanum* Cavender et al. (Raper 1984), which produce colored sorocarps, *D. longosporum* H. Hagiw.

(Hagiwara 1983a) with longer spores, and *D. capitatum* H. Hagiw. (Hagiwara 1983b) with smaller spores. Furthermore, *D. brefeldianum* is cosmopolitan and has already been reported in America, Canada, Germany, England, France, Denmark, Switzerland, Japan, New Guinea, Nepal, and Uganda (Hagiwara 1984). However, this is the first time *D. brefeldianum* has been isolated from samples from Ukraine.

Acknowledgments

We thank especially Profs. A.J.S. Whalley (Liverpool John Moore University, UK) and Guozhong Lü (Dalian Nationalities University, P.R. China) for their valuable revisions and kind help. This work was supported by National Natural Science Foundation of China (Project No. 30770005) and the fund from Ministry of Agriculture of China Project.

Literature cited

Brefeld O. 1869. *Dictyostelium mucoroides*. Ein neuer Organismus und der Verwandschaft der Myxomyceten. Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft 7: 85–107, pls. 1–3.

Hagiwara H. 1971. The *Acrasiales* in Japan. I. Bull. Natn. Sci. Mus., Tokyo, Ser. B. 14: 351–366.

Hagiwara H. 1983a. Four new species of dictyostelid cellular slime molds from Nepal. Bull. Natn. Sci. Mus., Tokyo, Ser. B. 9(4): 149–158.

Hagiwara H. 1983b. The *Acrasiales* in Japan. VI.. Bull. Natn. Sci. Mus., Tokyo, Ser. B. 9(2): 45–49.

Hagiwara H. 1984a. Review of *Dictyostelium mucoroides* Brefeld and *D. sphaerocephalum* (Oud.) Sacc. et March. Bull. Natn. Sci. Mus., Tokyo, Ser. B. 10(1): 27–41.

Hagiwara H. 1984b. The *Acrasiales* in Japan. VII. Bull. Natn. Sci. Mus., Tokyo, Ser. B. 10(2): 63–71.

Hagiwara H. 1991. A new species and some new records of dictyostelid cellular slime molds from Oman. Bull. Natn. Sci. Mus., Tokyo, Ser. B. 17(3): 109–121.

Hagiwara H. 1992. Taxonomic studies in dictyostelids. 1. *Dictyostelium giganteum* Singh, *D. firmibasis* Hagiwara and *D. magnum* Hagiwara. Bull. Natn. Sci. Mus., Tokyo, Ser. B. 18(3): 101–107.

Hagiwara H, Chien CY, Yeh ZY. 1992. Dictyostelid cellular slime molds of Taiwan. Bull. Natn. Sci. Mus., Tokyo, Ser. B. 18(2): 39–52.

He XL, Li Y. 2008. A new species of *Dictyostelium*. Mycotaxon 106: 379–383.

Kirk PM, Cannon PF, Minter DW, Stalpers JA. 2008. Dictionary of the Fungi, 10th edition. CAB International, Wallingford, UK.

Liu P, Li Y. 2010. Dictyostelids from Ukraine 1: two new records of *Dictyostelium*. Mycotaxon 111: 275–278.

Raper KB. 1984. The Dictyostelids. Princeton, New Jersey, USA.